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Women Farmers' Characteristics and Perception towards Climate Change and Variability in Iringa District, Tanzania

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Abstract

Perception is widely recognized to be a precondition for adaptation to climate change and variability. This study was conducted in the semi-arid part of Iringa District in Tanzania to establish association between women farmers' characteristics and perception towards climate change and variability. A cross-sectional research design and multistage random sampling technique was used in selecting 385 women farmers. Quantitative and qualitative data were analyzed by using Statistical Package for Social Sciences (SPSS) computer software and content analysis respectively. Findings show that majority of women farmers in study area have perceived high perception on climate change and variability as indicated by increase in number of seasons without enough rainfall, poor distribution of rainfall during rain season, rainfall peak season ending earlier than normal and increases of temperature in the study area. The study also observed significant difference ($P< 0.05$) in perception between women farmers with less numbers of years in farming and those with more. Nevertheless, the study found existence of no significant difference ($P>0.05$) in perception between women farmers with different characteristics such as marital status, education level attained, household size, being household head and land size cultivated. The study concluded that differences in women farmers' characteristics in the study area did not affect their perception toward climate change and variability. Therefore, the study recommends that, high level in perception on CC & V by women farmers in surveyed area should be taken as the stepping stone by the government and other development partners for setting up measures in helping women farmers to adapt to CC & V.

Key words: Women farmer, perception, climate variability, climate change and adaptation.

1.0 Introduction

Climate change and variability (CC & V) is a global phenomenon of which its impact has affected many societies worldwide. It is currently considered to be the most immediate and far-reaching threat to the natural environment. According to the Intergovernmental Panel on Climate Change (IPCC, 2007), global CC & V poses severe threats to the well-being of people living now and in the future. These threats manifest themselves through flooding, droughts, and temperature changes that can impact on crop production and management. The changes are always associated with widespread poverty, increased human diseases, and which is estimated to double the demand for food, water, and livestock forage within the next 30 years (IPCC, 2007). The impacts associated with CC & V vary from one country to another, from one region to another, and within community as a product of magnitude and frequency of hazards. In most cases the poorest populations and marginal groups in societies are impacted the most. On the other hand, due to social factors such as gender-specific division of labour and unequal access to resources, participation in decision-making, men and women are affected differently by climate change (Lambrou and Piana, 2005; Rohr, 2007). For example, the effect of CC & V that causes food shortage subjects women to increased workload in attempting to find food for the members of the family (Swai *et al*., 2012).

Perception is recognized to be the precondition for adaptation to CC & V. It is one among the factors that can influence farmer's decision whether to adapt or not to CC & V as they determine decisions of the farmers in management of agricultural activities. Several studies on climate change had revealed that most farmers now perceived the occurrences of CC & V (Maddison, 2006; Gbetibouo, 2009; Swai *et al.,* 2012; Kashaigili *et al.,* 2014). In those studies it was identified that farmers have perceived that weather has become hotter and the rains

less predictable and shorter in duration. While this information on farmers' perceptions on CC & V has been more evident, limited information is available on perception of women farmers with different characteristics on CC & V. Therefore, this study contributes to bridging the knowledge gaps based on Iringa Rural District of Tanzania.

2.0 The Study Methodology

This study was conducted in Isimani and Pawaga divisions of Iringa Rural District of Tanzania (Figure 1). The district, being part of South Highlands Zone, is located between latitudes 70.00' and 90.30' South of the Equator and 350 00'- 370 00' longitudes East of Greenwich. Administratively, Iringa Rural District is divided into six divisions, 20 wards and 119 villages. About, 95% of the district is predominantly rural area and agriculture is the main stay of the district's economy. The study areas fall within the semi-arid areas of Tanzania at altitudes between 900 to 1,200 m.a.s.l. and they are associated with low amount of rainfall between 500-600 mm per annum and high mean temperature between 15 ^{o}C to 20 ^{o}C (URT, 2007a). The study two divisions were deemed to be ideal for the study due their unique characteristics of being food insecure divisions in Iringa Rural district even when there is bumper harvest in other areas in the district.

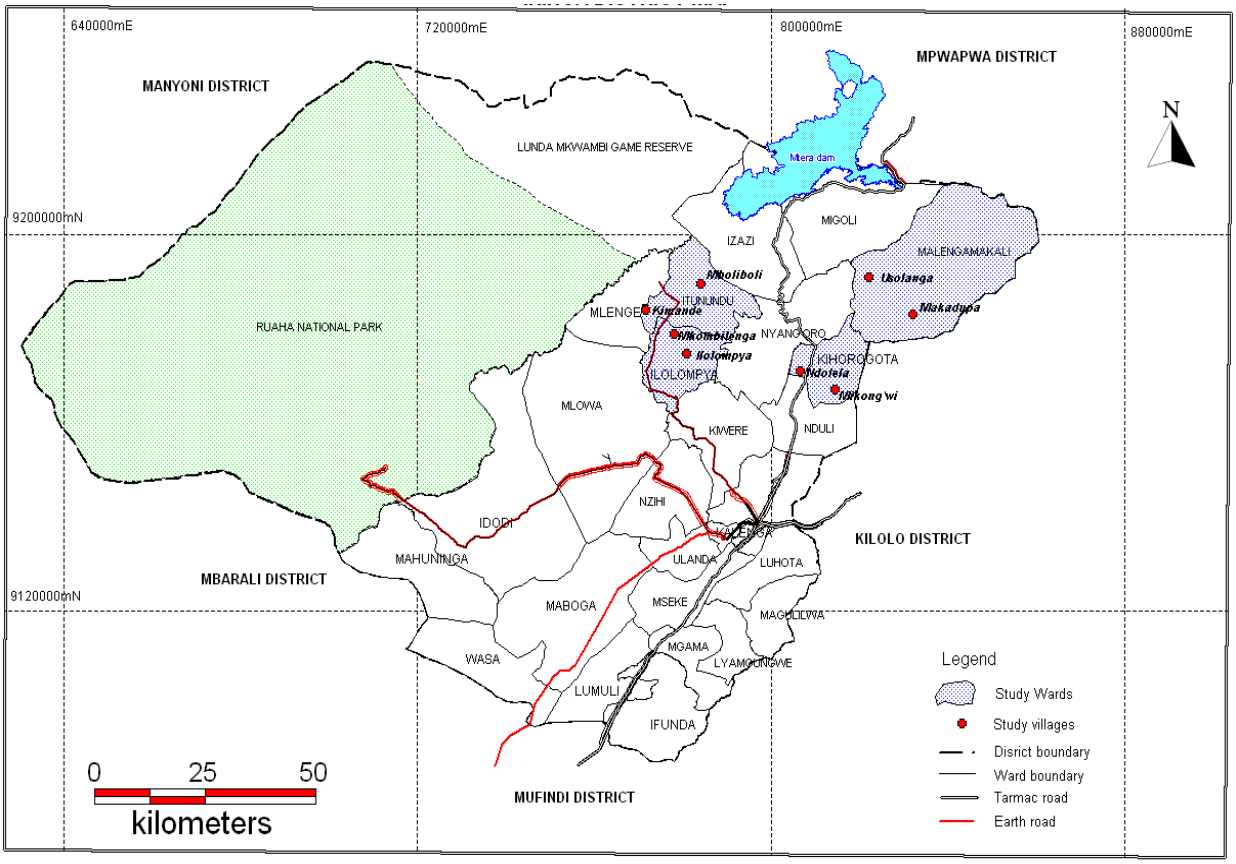

Figure 1**:** The map of the study area

The study population for this study was women farmers with age 35 years old and above from Isimani and Pawaga divisions. The villages covered by the study from Isimani division were Mikongwi, Ndolela, Usolanga and Makadupa. In Pawaga division, the villages involved were Kimande, Mboliboli, Ilolompya and Mkombilenga. The study adopted a cross-sectional research design in which data from respondents was collected at a single point in time. Purposive and simple random sampling technique was used to obtain villages and respondents involved in the study respectively. In-depth information on women farmers' perceptions was collected through focus group discussion guided by interview guide questions. The semi-structured questionnaires were administered to a total of 385 women farmers randomly selected from the target population in the study area. Quantitative data were analyzed by using Statistical Package for Social Sciences (SPSS) computer software. The association between women farmers' characteristics and perception towards CC & V was determined by using chi-square test. On the other hand, qualitative information was analyzed by using content analysis.

3.0 Results and Discussion

3.1 Characteristics of the respondents

Perception towards CC & V in the study area was assessed to the respondents of different characteristics such as age, education level, marital status and household head (Table 1). Other characteristics covered include household size and land size cultivated. In this study, it was postulated that, these respondents' characteristics can influence positively or negatively perception of respondents towards CC & V. Majority (60.3%) of respondents interviewed were of age group between 35 and 44. Others, 26% and 13.8% of the respondents interviewed found to be in age group of 45-64, and 65 years and above respectively. On the other hand, more than half (54.5%) of respondents interviewed had attained primary education. Respondents with non-formal education were 43.1%. The rest of the respondents (1.3% and 1.0%) interviewed had secondary and post secondary education respectively.

Table 1: Characteristics of respondents interviewed (N=385)

Respondents Characteristics	Iringa Rural District				Total (N=385)	
	Isimani division (n=288)		Pawaga division (n=97)			
	N	%	N	%	N	%
Age group in years						
35 – 44	171	59.4	61	62.9	232	60.3
45 – 64	72	24.7	29	29.9	100	26.0
65 years and above	45	15.6	7	7.2	53	13.8
Education level						
Non-formal education	132	45.8	34	35.1	166	43.1
Primary education	151	52.4	59	60.9	210	54.5
Secondary education	2	0.7	3	3.1	5	1.3
Post-secondary education	3	1.0	1.0	1.0	4	1.0
Marital status						
Married	186	64.6	70	72.2	256	66.5
Never married	4	1.4	3	3.1	7	1.8
Divorced	22	7.6	8	8.2	30	7.8
Widowed	37	12.8	8	8.2	45	1.7
Separated	39	13.5	8	8.2	47	12.2
Household head						
Yes	125	43.4	36	37.1	125	43.4
No	163	56.6	61	62.9	163	56.6
Household size						
< 4	71	24.7	29	29.9	100	26.0
4 – 6	112	38.9	45	46.4	157	40.8
7 – 9	87	30.2	18	18.6	105	27.3
> 9	18	6.2	5	5.2	23	6.0
Land size cultivated (ha)						
< 0.8	51	17.7	40	41.2	91	23.6
0.8 – 1.6	115	39.9	35	36.1	150	39.0
1.6 – 2.4	56	19.4	9	9.3	65	16.9
> 2.4	66	22.9	13	13.4	79	20.5

Marital status of the respondents is another important characteristic studied during the survey. About two thirds (66.5%) of the respondents interviewed were married. On the other hand, 12.2% of respondents interviewed were separated. The remaining 7.8%, 1.8% and 1.7% were divorced, never-married and widowed respectively. More than half (56.6%) of the respondents interviewed were not heads of their households, while 43.4% of the respondents interviewed were heads of the households. On the size of the land cultivated, 39% of respondents interviewed had cultivated between 0.8 to 1.6 ha. of land. The others, 23.6% and 20.5% of the respondents interviewed had been cultivated less than 0.8 ha and more than 2.4 ha respectively of land respectively. More than two thirds (68.1%) of respondents interviewed had household size ranging between 4 and 9 members. It is only 6% of the respondents interviewed who had household size of more than 9 members.

3.2 Women Farmers' Perceptions on CC & V in surveyed area

In this study, eight statements were formulated to assess perceptions of women farmers towards CC & V in the surveyed area. The statements used for assessment include: there is increasing number of seasons without enough rainfall; there is a change in amount of rainfall during rain seasons; there is a shift of timing of rainfall during rains season; rains starting late than normal. The other statements covered were:- rainfall peak season end earlier than normal; rainfall distribution within the season is now poor; temperature of the area is increasing; extended periods of high temperature, and increase in the frequency of droughts. In finding out overall perceptions of women farmers to the eight statements on CC & V, the study made the following assumptions: If a respondent scores 1 to all statements, the total scores will be 8; If a respondent scores 3 to all statements, the total scores will be 24, and if respondent scores 5 to all statements, the total scores will be 40. Therefore, the scores that range from 8 to 23 was regarded as low perception, 24 score was referred to neutral perception, and the scores of respondents falling between 25 and 40 were regarded as high perception. The findings show that more than three quarters (77.7%) of the respondents showed high perception to the statements on CC & V (Table 2). In this finding the proportion for Isimani area was about 79.5% and that of Pawaga reported to be 72.2% of the respondents. On the other hand, the proportion of the respondents who demonstrated low perception to the statements on CC & V in Isimani and Pawaga divisions were 13.5% and 25.8% respectively. This finding imply that majority of the respondents in surveyed area had demonstrated high perception toward statements on CC & V, of which majority of them are from Isimani division.

These findings on women farmers' perception on CC & V are in agreement with various studies in Tanzania and elsewhere in the world. For example, the Tanzania National Adaptation Programme of Action (NAPA) on climate change (2007b), established that severe droughts hit most parts of the country leading to severe food shortages, food insecurity, water scarcity, hunger and acute shortage of power signify the vulnerability of the country to impacts of climate change. It is also in agreement with what was reported by Maddison (2007) who pointed out the existence of evidence from a number of African countries that larger number of agriculturalist have already perceived that weather has become hotter and the rains less predictable and shorter in duration. It is also reported by Oxfam (2008), that farmers in Uganda had noticed the increases in frequency and intensity of drought, heavy rains, floods and erratic rainfall

The chi-square test was performed to find out if there difference in perception on CC & V between women farmers from the two divisions is significant or not. Results show that the calculated chi-square value was 10.062 while tabulated one was 5.540 at 2 degrees of freedom and 0.05 significance level (Table 2). Since the calculated value is greater than the tabulated one, these results suggest that the difference in perception between women farmers in the two divisions is statistically significant (P>0.05). That is to say more women farmers in Isimani division had perceived that there is decrease in rainfall amount, delay of onset of rainfall, an increase in temperature, poor distribution of rainfall during rain season and rainfall peak season ending earlier than normal compared to their counterpart in Pawaga division. A possible reason for these findings may be due to the fact that women farmers in Isimani division lack irrigation infrastructure that make them to depend entirely on rain-fed agriculture of which is more susceptible to CC & V. The absence of irrigation infrastructure in the area has resulted for the farming activity to be more seasonal and the women farmers are more likely to note presence of CC & V as it has more impact on their main economic activity. According to Gbetibouo (2009) perception of farmers to CC & V can be influence by factors such as availability of irrigation water, soil fertility and information from the media.

Table 2: Overall perceptions of women farmers on CC & V in surveyed area

Overall perception	Division				Total		Chi-square Value		P Value
	Isimani		Pawaga						
	F	%	F	%	F	%	Observ.	Expe.	
Low perception	39	13.5	25	25.8	64	16.6			
Neutral perception	20	6.9	2	2.1	22	5.7	10.062	5.540	0.007
High perception	229	79.5	70	72.2	299	77.7			

The identified women farmers' perception on the trends of temperature and rainfall pattern in surveyed area were compared to statistical data from the Iringa Water Basin-Mtera station for between 1970 and 2010 and from Tanzania Meteorological Agency at Nduli station (Iringa) between 1994 and 2014 respectively. Results of analysis show that there is significant increase in mean temperature during the wet season (R^2=0.279, p=0.01) and dry season as shown in Figure 2 and 3 respectively. This findings from analysis is similar from what reported by women farmers during FGDs in the surveyed area of which majority of women farmers reported an increased in temperature in their area.

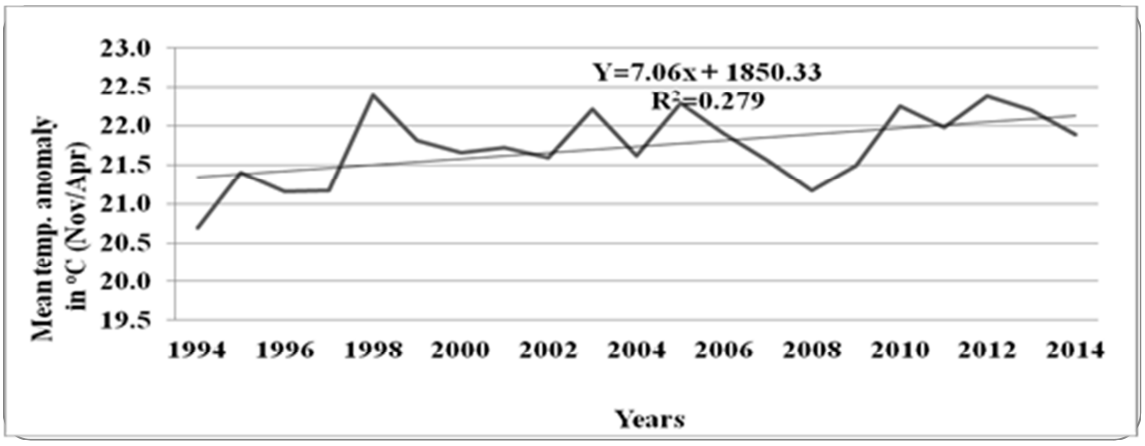

Figure 2: Mean temperature anomaly during wet season area

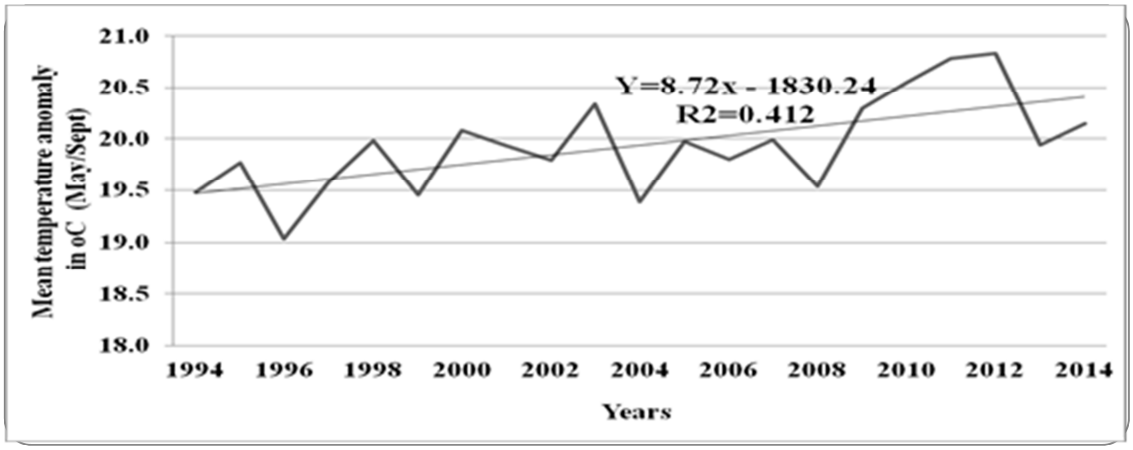

Figure 3: Mean temperature anomaly during dry season in the area

During FGDs with women farmers, it was identified that March and November are the period for onset and rainfall peak in the surveyed area. An analysis of the rainfall data for November and March in the study area show that there is a slight increase in the amount of rainfall for the past 30 years, even though the increase itself was observed to be statistically insignificant (R^2 = 0.022, p = 0.352) and (R^2 = 0.0344, p=0.271) respectively as shown in Figure 4 and 5. However, the analysis of statistical data show that there is statistical insignificant (R^2=0.001, p = 0.816) decrease in annual rainfall amount for the same period, as shown in Figure 6. The similar pattern has been noted in Shinyaga district of Tanzania by Lyimo and Kihupi (2010), that annual rainfall amount has been in declining trends, but the decrease was not statistically significant. The analysis of meteorological data also shows there is a change in timing of rains in the surveyed area. Results of the findings show the onset of rains in 1970s to late 1980s was November, but from early 1990s to 2010s has shifted to December (Figure 3). The ending time of rains in 1970s to late 1980s was in May, but currently it has shifted to April.

The findings of statistical data show rains is now start late and end early imply that women farmers in the surveyed area are now experiencing the declining of the length of growing season. This can have negative effects on women farmers' crops productivity and food security in surveyed area. However, perceived decreases in rainfall amount during rainfall peak season by respondents were found to differ with the statistical rainfall data. The discrepancy in views may be attributed by the fact that most farmers tend to associate start late and end early

in rainfall with decreases in rainfall amount as the former reported to affect more their socio-economic activities as compared with the latter. This finding on women farmers' perception on CC & V is in agreement with what reported by Ishaya and Abaje (2008) in Nigeria and Gbetibouo (2009) in South Africa that farmers are now perceive that climate had been changing over the year.

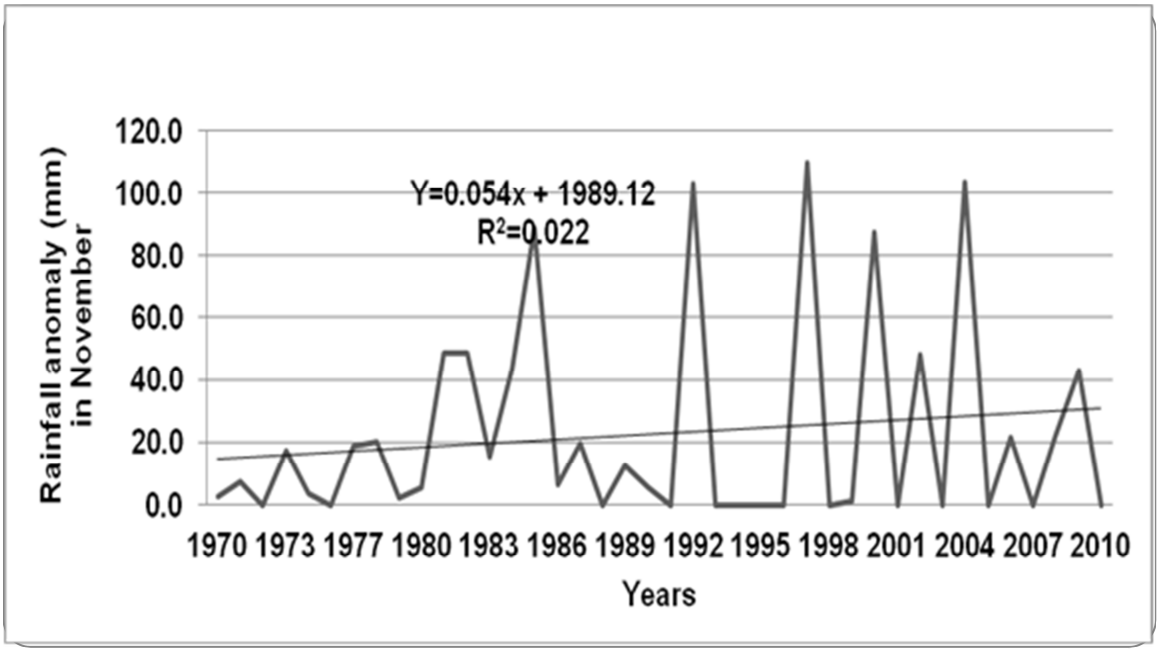

Figure 4: Trends of rainfall change and variability from 1970-2010 at November in the area

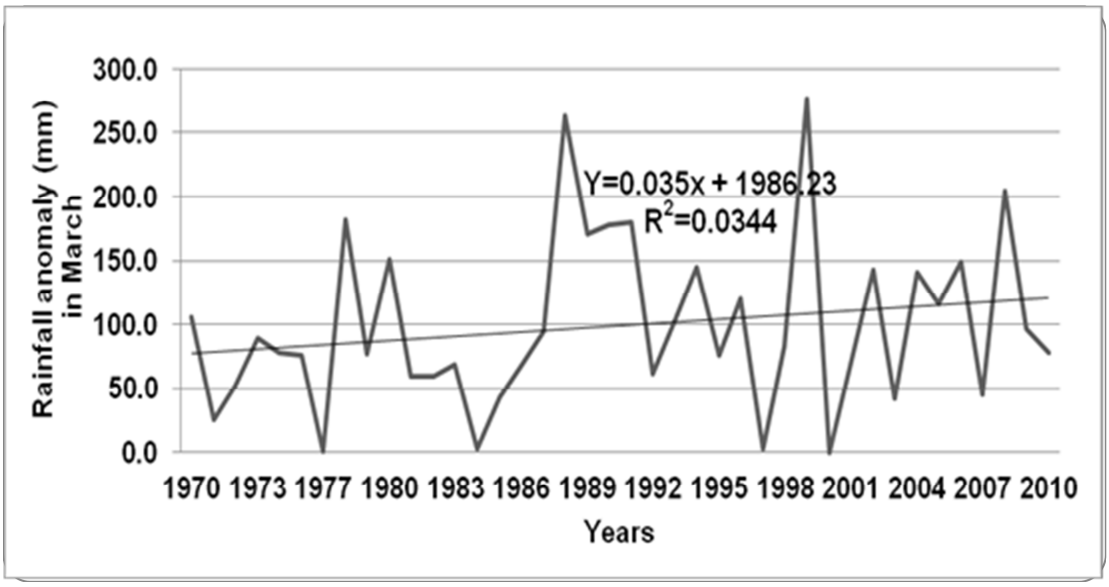

Figure 5: Trends of rainfall change and variability from 1970-2010 at March in the area

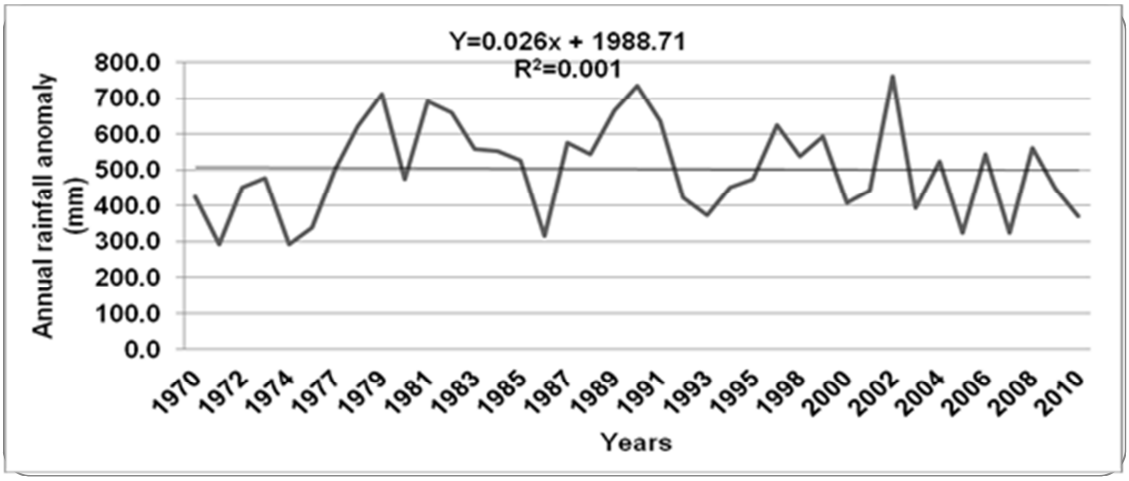

Figure 6: Trends of annual rainfall change and variability from 1970-2010 in the area

3.3 Association between women farmers' characteristics and perception towards CC & V

A chi-square test was used to determine the association between respondents' characteristics and perception towards CC & V. Characteristics of the respondents covered include marital status, education level, household level, household heads, size of land cultivated and experiences in farming activities as shown in Table 3. The chi-square test results show an existence of significant differences ($P< 0.05$) between respondents' number of years in farming activity and perceptions towards CC & V. This finding is similar to those unveiled by Nhemachena and Hassan (2007) that numbers of years in farming gives to a farmer better knowledge and information on changes in climatic conditions. In this study, women farmers with 10 years and above in farming noted to perceive more the changes of CC & V as compared to those with less than 10 years. This finding is supported by in-depth interview data from an old woman farmer at Ndolela village who claimed: "*incidence of irregularities in rainfall patterns and increase in hot conditions in our area is common. For example, now it is hard for us to predict the starting dates for the first rains and even when it rains, always it doesn't stay longer. We are now experiencing an increase of malaria incidences which was not the case in the past 20 years. We are in trouble …..*"

Nonetheless, chi-square test results had revealed existence of no significant differences ($P>0.05$) between marital status, education level, household size, being household head, land size cultivated of the respondents and perceptions toward CC & V. The findings imply that there were no significant differences in perceptions between married respondents and those unmarried. For example all of them reported to perceive decrease and increase in rainfall and temperature respectively. Furthermore, they were also found to be aware of the variations of rainfall patterns in the surveyed area. Existence of no significant differences on how the two groups perceived to the changes in climate may be explained by the fact that in rural settings, most of the farming activities are done by women regardless of their marital status, this paves the way for the married respondents and those unmarried to notice changes in CC & V the same.

As for education level of the respondents, the study established the existence of no significant differences on perceptions toward CC & V between respondents with formal education and those without ($P>0.05$). These findings contradict with the findings by Ndambiri *et al*.,(2012) who noted that more educated farmers are more likely to perceive changes of climate as they have more accessibility to climate information. It is also assumed that education is likely to enhance farmers' ability to receive and comprehend information on CC & V. The possible explanation for this finding can be due to the fact that majority of the respondents interviewed have informal and primary level of education. Thus, under normal circumstances one could have not expected for the two groups to differ much in terms of how they perceived CC & V as they all depend on farming as their livelihood strategy. On the other hand, in all villages surveyed, women farmers were found to depend on radio and village community meetings as the sources of information for the CC & V.

Table 3: Association between respondents' characteristics and perceptions toward CC & V

Category of responses	Respondents' perception toward CC & V						Chi-square Value		P value
	Positive perception		Neutral		Negative perception				
	F	%	F	%	F	%	Observ	Expect	
Marital status									
Married	48	75	14	63.6	194	64.9	2.507	7.37	0.285
Single	16	25	8	36.4	105	35.1			
Education level attained									
Formal	26	40.6	8	36.4	132	44.1	.0701	9.49	0.705
Non formal	38	59.4	14	63.6	167	55.9			
Household Size									
< 4	119	80.4	7	4.7	22	14.9	1.088	8.46	0.580
4 and above	180	75.9	15	6.3	42	17.7			
Head of the household									
Yes	128	79.5	9	5.6	24	14.9	0.619	9.20	0.734
No	171	76.3	13	5.8	40	17.9			
Size of land cultivated (ha)									
< 1.6	208	76.8	15	5.5	48	17.7	0.802	6.51	0.670
1.6 and above	91	79.8	7	6.1	16	14.0			
Years spent in farming									
<10	6	9.2	1	1.5	58	79.2	6.305	3.71	0.043
10 and above	241	75.3	21	6.6	58	18.1			

In relation to the household size of the respondents, the study revealed that there are no significant differences on perceptions between respondents from households with less members and those with more household members. However, this finding is not similar with what was reported by Ndambiri *et al.* (2012) that large households had less chances of perceiving climate change than smaller households and they were less likely to adapt to the impact of CC & V. This finding of no differences in perceptions between the two groups may be caused by the fact that impacts of CC & V were likely to affect both, respondents from small households and large households as they all depend mostly on farming activities for their livelihood and hence contributed to the feeling that changes of CC & V do not differ between respondents. On the other hand, this study revealed an existence of no significant difference (P>0.05) between the respondents who were heads of households and those with no perceptions toward CC & V. The study also established existence of no significant difference (P>0.05) between land size cultivated by the respondent and the perceptions toward CC & V. These findings contradict the understanding that, being a head of the household, one is likely to be charged with the responsibilities of providing food, clothes and shelter to the members of the household and consequently be more likely to perceive changes in CC & V. This is due to the fact that, CC & V has an impact on these responsibilities of the head of the household and bearing in mind that perception on climate is based on economic and social impacts it has on personal lives.

4.0 Conclusions and policy recommendations

The study set out to establish association between women farmers' characteristics and perceptions toward CC & V in Tanzania with special reference to Iringa Rural District. It was found that majority of women farmers interviewed had perceived changes and variability of climate such as increased number of seasons without enough rainfall, rainfall peak season ends earlier than normal, poor rainfall distribution within the seasons and increasing temperature in the study area. These perceived changes and variability of rainfall and temperature by the farmers were found to be similar to the analysed rainfall and temperature data. The study concluded that there is significant difference in perception between women farmers with more numbers of years in farming and those with less. The study also do not show significant difference on perception to CC & V among women farmers with different characteristics such as marital status, education level, household size, household head and size of land cultivated. The study recommends that, the higher level of perception on CC & V by women farmers

in the study area should be taken as the stepping stone by the government and development partners for setting up appropriate measures in helping women farmers adapt to CC & V.

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References

Gbetibouo, G. A. (2009). Understanding farmers' perceptions and adaptations to climate change and variability: the case of the Limpopo basin, South Africa. IFPRIdiscussion paper 00849. Washington, DC: IFPRI. Available: www.fao.org/fileadmin/user_upload/.../docs/ifpri_limpopo dp00849.pdf. Visited on 24/04/2014.

Intergovernmental Panel on Climate Change (2007). Summary for Policy Makers: In: Climate Change 2007. Impacts, adaptation and vulnerability. Contribution of working group II to the fourth assessment report Intergovernmental Panel on Climate Change.(Edited by Parry, M.I., Canziani, O.F., Palutikof, G.P., van der Linden, P.J., and Hanson, C.E. Cambridge University Press, Cambridge, UK. pp. 7-22

Kashaigili, J.J., Levira, P., Liwenga, E. and Mdemu, M.V. (2014). Analysis of Climate Variability, Perceptions and Coping Strategies of Tanzanian Coastal Forest Dependent Communities. American Journal of Climate Change, 3, 212-222. http://dx.doi.org/10.4236/ajcc.2014.32020. Retrieved on 7th of February, 2014.

Lambrou, Y. and Piana, G. (2005). Gender: the missing component in the response to climate change, Food and Agriculture Organization of the United Nations, Rome, available at: http://www.fao.org/sd/dim pe1/docs/pe1 051001d1b.pdf, 46 pp.

Lyimo, J.G. and Kangalawe, R.Y.M. (2010). Vulnerability and Adaptive Strategies to the Impact of Climate Change and Variability. The Case of Rural Households in Semi-arid Tanzania. Environmental Economica Journal 1 (2): 87-97.

Maddison, D. (2006). The perception of and adaptation to climate change in Africa. CEEPA Discussion Paper No. 10. Centre for Environmental Economics and Policy in Africa, University of Pretoria, South Africa. 47pp.

Maddison, D. (2007). The perception of and adaptation to climate change in Africa. The World Bank, Development Research Group Sustainable Rural and Urban Development Team. Policy Research Working Paper 4308. 57pp. Available: http://www-s.worldbank.org/servlet. Accessed on June, 2014.

Nhemachena, C. and Hassan, R. (2007). Micro-level analysis of farmers' adaptation to climate change in Southern Africa. IFPRI Discussion Paper No. 00714. International Food Policy Research Institute, Washington, DC.

Oxfam (2008). Turning up the heat: Climate change and poverty in Uganda. Oxfam GB, online ISBN 978-1-84814-039-4. Available: www.oxfam.org.uk/policy/climate_change/ugandanclimate_change.pdf. Accessed on 22/05/2014.

Rohr, U. (2007). Gender, Climate Change and Adaptation. Introduction to the gender dimensions.11pp. Available at: (http://www.bothends.org/service/casestudy genanet.pdf.) Downloaded 23rd of March, 2012.

Swai, W. O., Jonathan S. M., Flavianus T. M. (2012). Perceived Effects of Climate Change on Agricultural Production: A Gendered Analysis Done in Bahi and Kondoa Districts, Dodoma Region, Tanzania. Research on Humanities and Social Sciences. 2 (9), 11 pp.

United Republic of Tanzania (2007a). Iringa Region Socioeconomic Profile. Ministry of Planning, Economy and Empowerment, Dar es Salaam. 274pp.

United Republic of Tanzania (2007b). Tanzania National Adaptation Programme of Action (NAPA). Vice President's Office, Division of Environment, 61pp.

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